

# PAEDIATRIC BURNS IN SULAIMANI, IRAQ

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**SUMMARY.** Burns are the most frequent injury among paediatric patients. The injury, treatment, and rehabilitation process affect children not only physiologically but also psychologically. In this prospective study of burn victims aged 12 yr and less hospitalized in our burns centre (Emergency Hospital) between July 2001 and August 2005, three age groups were considered (0-12 months, 1-6 yr, and 7-12 yr), distinguished on the basis of children's predominant activity and behaviour. The study reports on the characteristics of burn injuries in children hospitalized in the Emergency Hospital at the burns centre in Sulaimani, Iraq. In the period of study, 3550 children with burn injuries were treated in our burns centre (in-patients and out-patients), made up 44% (3550/8000) of all burn victims treated in our burns centre in that period. The children's mean age was  $4.03 \pm 1.62$  yr. The male/female ratio was 1:1.1 (1725/1825). Scald burns, accounting for 79.4% of the cases, were the commonest injuries in the study, compared with 20.6% non-scald burns. Most of the injuries happened in the home (74.7%). The trunk was affected in 78.6% of all patients studied. Meal times (especially dinner, 6-9 p.m., and lunch 11 a.m.-2 p.m) clearly had the highest number of accidents. There were more paediatric burns in the colder months (38.2% in winter). Surgery was performed in 553 patients (15.6%). In the five years studied, there were 411 in-hospital child deaths due to burns (11.5%).

## Introduction

Burns are the most frequent injury among paediatric patients.<sup>1</sup> The injury, treatment, and rehabilitation process affect children not only physiologically but also psychologically.<sup>2</sup> The poor prognosis due to scar contractures, deformities, and functional limitations makes their further life more difficult. In addition, the long and painful process of scar treatment comes with a significant financial burden for parents and society.<sup>3</sup> Epidemiological data on childhood burn injuries provide vital information for developing strategies aimed at reducing the frequency of burns. There is a need for data on the settings in which paediatric burns are most likely to occur.

In the present study, the characteristics of burn injuries in children hospitalized in the burns centre at the Emergency Hospital, Sulaimani, Iraq, were investigated in order to identify the aetiology of the burns, the mechanism of injury, and the relationship to lifestyle and specific culinary habits. Sulaimani is the largest city in Kurdistan in Iraq. The Emergency Hospital Burns Centre has 60 beds for acute burns and 30 beds for post-burn reconstructive surgery, serving a population of more than two million Sulaimani residents.

## Patients and methods

This is a prospective study of burn victims aged 12 yr and younger who were hospitalized in our Burns Centre Emergency Hospital between July 2001 and August

2005 (Table I). Three age groups (0-12 months, 1-6 yr, and 7-12 yr) were distinguished, bearing in mind children's main activities and behaviour, with some modification of earlier reports.<sup>2,4,5</sup> These age groups were:

- 0-12 months: most infants in this group are totally dependent on their parents or caregivers in their daily life. Motion activity is limited.
- 1-6 yr: in this group, children are capable of self-motion. They begin to learn how to use some tableware for food. Out of curiosity for the environment, they touch everything they can find but have scanty knowledge of potential risk in the environment and still need the protection of adults.
- 7-12 years: Iraqi children start school at 6 yr and in this age group they have more ideas about the environment. They always try to engage their attention in new events and activities.

**Table I** - Number of patients during period of study

Year	Number of patients	Percentage
2001	745	20.9
2002	670	18.9
2003	690	19.5
2004	715	20.1
2005	730	20.6
Total	3550	100.0

The patients' demographic details and data on the nature of injuries, treatment, and outcome were obtained from the registry. The parameters included age, gender, cause of injury, place of event, total body surface area (TBSA), injury severity, and surgical intervention. In-patient survival and progress were also noted.

The severity of the burns was classified in four grades: mild (<6% TBSA), moderate (7-15% TBSA), extensive (16-25% TBSA), and critical (>26% TBSA or third-degree wound >5% TBSA).

More precisely, three questions were addressed, namely:

1. Are childhood burn injuries equally distributed across age groups, gender, and population groups?
2. Are there seasonal variations?
3. What are the most typical circumstances of the occurrence of childhood burn injuries and are they equally distributed across population groups?

## Results

During the period of study, 3550 children with burn injuries were treated in our burns centre (in-patients and out-patients), corresponding to 44% (3550/8000) of all burn victims treated in our burns centre in that period.

### Age and sex

The mean age of the children was  $4.03 \pm 1.62$  yr. The male/female ratio was 1:1.1 (1725/1825). The greatest number of paediatric burns, as indicated in Fig. 1, occurred in the age group 1-6 yr (50.7%), followed by the age group 7-12 yr (33.8%), and then 0-1 yr (15.5%).

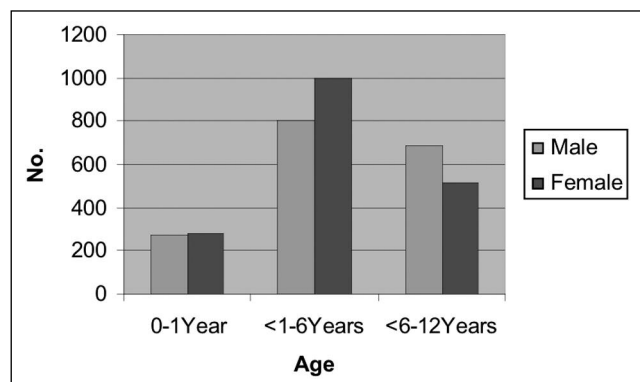


Fig. 1 - Patients' age and sex distribution.

### Causes of the burns

Scald burns, accounting for 79.4% of all burns, were the major cause of injury in our study, compared with non-scald burns (20.6%) (Table II). Scald burns were found to have a higher incidence than non-scald burns in all age groups. Among the scald injuries, 79.3% (63.0% of all paediatric burns) were caused by non-bath-related circumstances, and only 585 (16.4% of all paediatric burns) were due to hot baths (Table III). Hot drinks (48.5%) and hot soup (14.5%) were the two leading causes in non-bath scalding. Flame burns (94.1%; 19.4% of all paediatric burns) accounted for the highest incidence in non-scald burns.

### Place of accident

Most of the burn injuries (74.7%) happened in the home (Fig. 2) - 47.9% in the kitchen area, 34.6% in the living-room, and 16.4% in the bathroom. Only 25.3% of the paediatric burns occurred outside the home.

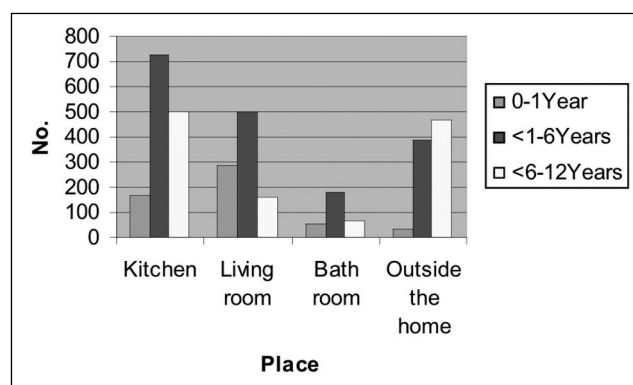


Fig. 2 - Place of accident in the various age groups.

### Burn extent

The mean TBSA burned was 12.4% in the 0-12 months group, 16.3% in the 1-6 yr group, and 14.0% in the 7-12 yr group (Fig. 3).

### Site of injury

The trunk was affected in 78.6% of the patients studied. The head and neck area, which was the second most frequently burned site, was affected in 68.2% of the patients, and the upper and lower extremities were involved

Table II - Burn agents

Scald burns (2820)			Non-scald burns (730)		
Non-bath, 2253 (63%)		Bath, 585 (16.4%)			
Hot drinks	Hot soup		Flame	Electric burn	Chemical burn
Number 1720	515	585	687	40	3
Percentage 48.5	14.5	16.4	19.4	1.1	0.1

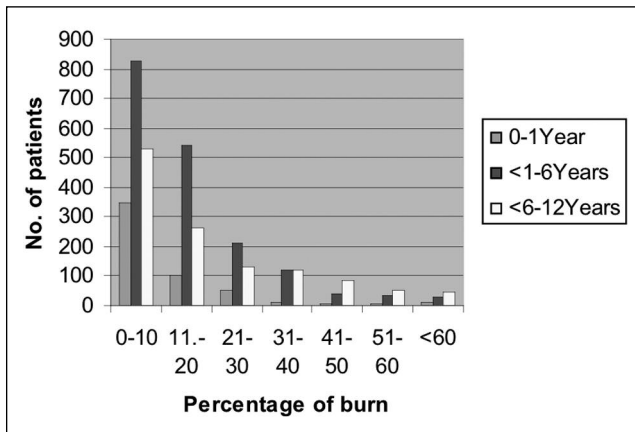


Fig. 3 - Burn extent.

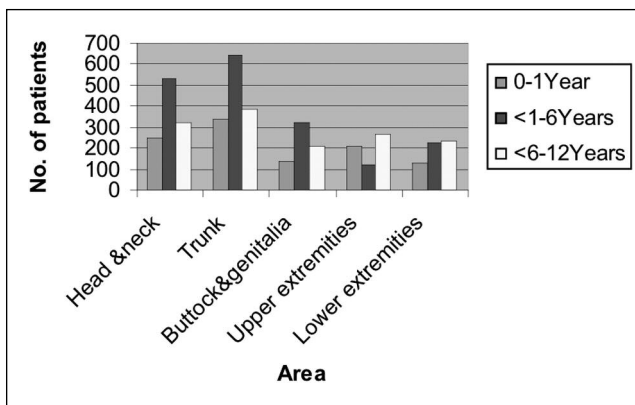


Fig. 4 - Body areas burned.

in respectively 60.3% and 42.9% of the cases (Fig. 4). It is interesting to note that the trunk, the head and neck areas, and the upper extremities were the sites most involved in non-bath-related scalds, while in bath scalds the lower extremities, the trunk, and the buttocks and genitalia were frequently burned sites. The lower extremity areas were by far the most affected site in flame burns.

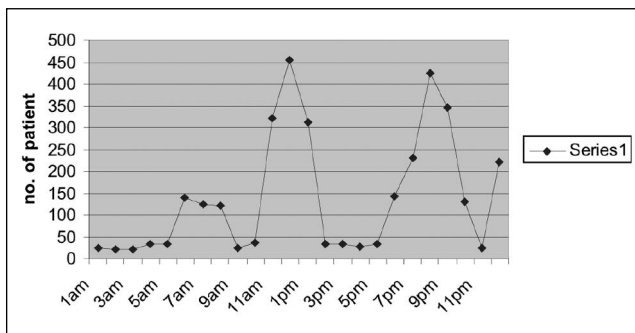


Fig. 5 - Time of burn.

#### Time of burn

Meal times (especially dinner, 6-9 p.m. and lunch, 11 a.m.-2 p.m) clearly had the highest number of accidents (Fig. 5). Thirty-five per cent of all paediatric burns occurred at lunch time and 19.7% at dinner time.

#### Monthly distribution

Fig. 6 shows the monthly fluctuation of paediatric burns in relation to the Sulaimani seasons of spring (March-May), summer (June-August), autumn (September-November), and winter (December-February). There were more paediatric burns in the colder months (38.2% in winter).

#### Hospital admission

One thousand six hundred children (45%) were admitted to hospital during the period of study.

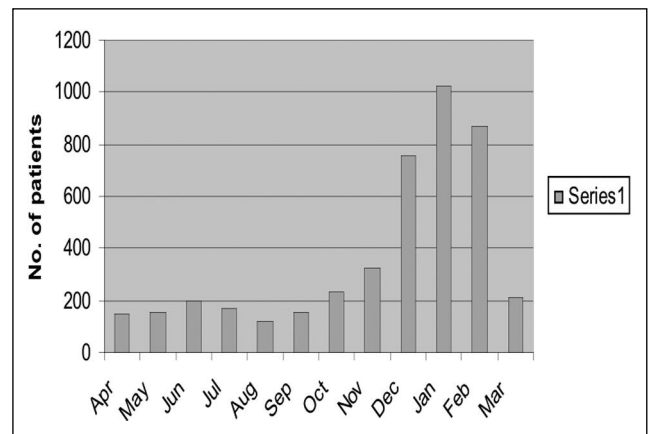


Fig. 6 - Monthly distribution of burns.

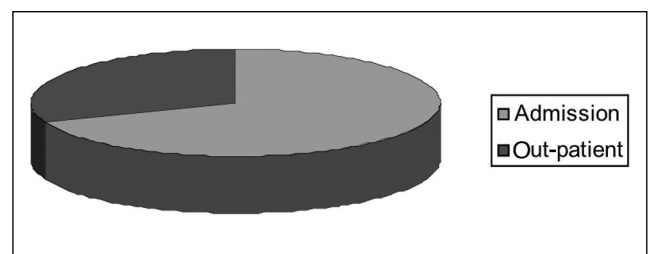


Fig. 7 - Hospital admission.

#### Treatment of the patients

Surgery was performed in 553 of the patients (15.6%). The greater the severity and the extent of the burns, the higher the percentage of patients undergoing surgical procedures. Surgical treatment was performed in 33% of the burn patients with a burn area of 10% or less, compared with 69% in patients with 40% TBSA and more.

### *In-patient mortality*

In the five-year period of study, there were 411 in-hospital child deaths due to burns (11.5%). Seventy-six per cent of the burn-related deaths were in children with a burn area of 40% and more. Children aged 7-12 yr accounted for 57% of the deaths but represented only 35% of the hospitalized burn patients. Fire-related burn injuries accounted for 65% of the deaths and 35% were due to scalds.

## **Discussion**

The culture of food habits is quite different between the eastern and the western worlds. In Sulaimani, members of an extended family always gather for meals. Most adults (parents or caregivers) are used to taking care of young children while they are cooking or eating. The most frequent cause of burns is the cooking system used in the home, consisting of a kerosene ring utilized in the absence of a centralized domestic gas supply. These gas rings are very low on the floor and the pots are unsteady. When children or women are near a gas ring they can easily sustain a burn by knocking a pot over. Kerosene is ubiquitous and is commonly sold in the street in plastic containers, mainly by children. Children are frequently seen playing with this dangerous substance on the sidewalks, splashing about in it, and exposing themselves to the risk of a serious accident.

Scald burns predominated over non-scald burns in each age group in our study, which is consistent with earlier reports.<sup>1,2,4,5</sup> In the youngest age groups (0-12 months and 1-6 yr), there were many more scald burns than non-scald burns (respectively 7.5 and 4 times more (*Table II*). Further analysis showed that non-bath-related scalds prevailed over bath-related scalding (*Table II*). Hot soup and hot drinks (e.g. water, milk, tea, and coffee) caused most of the cases of non-bath-related scalds.

The sites of injury in non-bath scalds were commonly the trunk (84.5%), the head and neck (75.7%), and the upper extremities (68.4%) (*Fig. 4*). Significantly, when non-bath-related scalds occurred (caused by hot soup or hot drinks), the upper body was frequently found to be involved. However, the lower body areas (lower extremities, 65.0%; buttocks and genitalia, 54.2%) were the two most frequent sites of injury seen in bath scalds. The explanation may be the immersion in a hot tub, which led to children being more frequently burned in lower body areas when such an accident happened. With this burn mecha-

nism, the upper body areas (28.1% in the head and neck and 37.0% in the upper extremities) were less often involved.

Seventy-four per cent of the paediatric burns occurred in the home, which is where, in our patients in the age group 0-12 months, most of the burn injuries happened (*Fig. 2*). The comparative limitation of small children's daily activity may be the reason. The kitchen/dining area and the living-room, which are usually adjacent because of the limited space in most homes, were the most frequent places in paediatric burns. Whether overcrowding in the living space is relevant in paediatric burns remains to be surveyed.

In our study, the two genders were affected almost equally, contrary to some other reports (with male predominance and a male/female ratio varying from 1.5 to 2.6 to 1).<sup>2,3,6-8</sup> Conversely, Kumar et al. reported a high female/male ratio (3:1).<sup>9</sup> The gender factor in paediatric burns has to be further investigated.

The majority of paediatric burns in our study were in the age group 1-6 yr, which is consistent with most reports.<sup>1,4,10,11</sup> Surprisingly, there are few reports related to the time of day in paediatric burns. Chien et al. found that about 23% of burns occurred between 10 and 12 a.m. (lunch time) and they also found a relatively high incidence between 4 and 6 p.m.<sup>12</sup> In the present study, two meal time periods (11 a.m.-1 p.m. and 5-8 p.m.) were identified as high-risk times for paediatric burns (respectively 35.0% and 19.7% at dinner and lunch time) (*Fig. 3*). The two peak incidences in the time of injury were similar, but in our study (which focuses on paediatric burns) dinner time was more dangerous than lunch time, which was the most frequent time of injury in Chien's report.

With regard to monthly fluctuations, our study found that there was a higher incidence of paediatric burns in the colder months (33.1% in autumn and 38.2% in winter). Cronin et al. produced a similar report, indicating that in Ireland more paediatric burns occurred during the colder winter months.<sup>2</sup> In South Africa, Van Niekerk et al. reported that most childhood burns occurred between April and October.<sup>5</sup> The colder months had more paediatric burns in these two studies,<sup>2,13</sup> but the higher incidence of paediatric burns in winter and autumn in our study may not be simply a matter of the climate. The higher number of paediatric burns in winter and autumn found in our study may also be related to specific culinary habits (such as making hot tea in the colder seasons).

**RÉSUMÉ.** Chez les patients en âge pédiatrique, les brûlures constituent la lésion la plus fréquente. La lésion, le traitement et la rééducation ont des conséquences non seulement physiologiques mais aussi psychologiques. Dans cette étude prospective des patients brûlés âgés jusqu'à douze ans hospitalisés dans notre centre des brûlés (Service des Urgences) entre juillet 2001 et août 2005, trois groupes d'âge ont été considérés (0-12 mois, 1-6 ans et 7-12 ans), différenciés sur la base des activités et des comportements prévalents des enfants. L'étude décrit les caractéristiques des brûlures des enfants hospitalisés dans le Service des Urgences au cen-

tre des brûlés à Sulaimani, Iraq. Pendant la période prise en considération, les 3550 enfants brûlés traités dans notre centre (hospitalisés ou en consultation externe) constituaient le 44% (3550/8000) de tous les patients brûlés traités dans notre centre des brûlés dans la période considérée. L'âge moyen des enfants était de  $4,03 \pm 1,62$  ans. Le rapport mâle/femelle était de 1:1,1 (1725/1825). Les brûlures par ébouillement, qui constituaient le 79,4% des cas, étaient les lésions les plus communes dans l'étude, par rapport au 20,6% des brûlures non dues à l'ébouillement. La plupart des lésions (74,7%) se sont produites dans l'environnement domestique. Le tronc a été intéressé dans le 78,6% de tous les patients étudiés. L'heure du repas (en particulier le dîner, 18-21 heures, et le déjeuner, 11-14 heures) présentait clairement la fréquence la plus élevée d'accidents. Les brûlures pédiatriques étaient plus communes dans les mois plus froids (38,2% en hiver). Une intervention chirurgicale a été effectuée chez 553 patients (15,6%). Pendant les cinq ans de l'étude, 411 décès (11,5%) se sont vérifiés en hôpital à cause des brûlures.

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